

## **4.0 SUMMARY**

The USACE implements a yearly monitoring program at F. E. Walter Reservoir to evaluate potential public health and environmental concerns. In general, the monitoring programs emphasize measuring water quality and sediment contamination. Monitoring results are compared to state and federal criteria to evaluate the condition of F. E. Walter Reservoir. The 2003 monitoring program of F. E. Walter Reservoir comprised five major elements:

- Monthly water quality and bacteria monitoring from May through September to evaluate compliance with the Pennsylvania state water quality standards;
- Meteorological monitoring of air temperature, relative humidity, solar radiation, wind speed and direction every ½ hour at the F. E. Walter Reservoir discharge tower;
- Sediment priority pollutant monitoring of metals and acid/base neutral extractables to evaluate sediment toxicity relative to identified screening concentrations;
- Drinking water monitoring to ensure public health safety by comparing water quality from a drinking water source to standards determined by the Safe Drinking Water Act (SDWA); and
- Ambient water temperature was recorded every ½ hour with Onset Computer Corporation TidbiT<sup>™</sup> probes at five stations along the Lehigh River.

### **4.1 WATER QUALITY MONITORING**

Water quality monitoring at F. E. Walter Reservoir generally indicated the presence of acceptable conditions during 2003. Measures of pH were not in compliance with the PADEP water quality standard range, the range is from 6 to 9. Station WA-6 was below standard in May and June. Stations WA-2, -5, and -6 were below the standard on 13 August. Additionally, stations WA-2, -3, -5, -6, and -7 were below the standard on 24 September.

F. E. Walter Reservoir contained acceptable levels of nutrients during 2003. Measures for total phosphorus with results greater than the detection limit exceeded the EPA guideline in 100% of the samples. However, the minimum detection limit was greater than the EPA guideline. Ammonia, nitrate + nitrite, TDS, and alkalinity were in compliance with state water quality standards throughout the reservoir watershed.

## **4.2 MONITORING PROGRAM TRENDS**

Trends computed for individual stations using the Mann-Kendall test indicated significant water quality changes at several locations in the F. E. Walter Reservoir drainage. DO was decreasing in the spring and summer at WA-2 and the summer at station WA-5. Ammonia was decreasing in the reservoir watershed except at WA-3 in the summer and WA-5 in both spring and summer seasons. Station WA-1 had a decreasing trend for total nitrogen during the summer. Trends for fecal coliform were increasing during the summer at upstream stations, WA-3, -4 and -5, as well as downstream of the reservoir at station WA-1. Trends for total phosphorus, TDS, BOD, and total coliform were not significant.

## **4.3 TROPHIC STATE CLASSIFICATION**

The trophic condition of F.E. Walter Reservoir was characterized as mesotrophic/mesoeutrophic in 2003. The trophic status was defined independently by Carlson's trophic state indices and EPA criteria. Both classifications were based on concentrations of total phosphorus, chlorophyll *a* and secchi disk depths.

## **4.4 COLIFORM BACTERIA MONITORING**

Coliform bacteria contamination at F. E. Walter Reservoir was predominately in compliance with the PADEP water quality standard for bacteria contamination during 2003. The geometric means among samples collected each month were less than 200 colonies/100-ml except on 24 September. Both regression and Mann-Kendall analyses indicated an increasing trend for fecal coliform downstream of the reservoir during summer. The Mann-Kendall also determined an increasing trend upstream on the Lehigh River (WA-3, -4, and -5) for fecal coliform during the summer.

## **4.5 SEDIMENT PRIORITY POLLUTANT MONITORING**

F.E. Walter Reservoir was in compliance with NJDEP soil guidelines in 2003. Of the 93 priority pollutant contaminants analyzed in F.E. Walter Reservoir sediments, none were detected and all parameters were measured at levels below sediment screening levels. A total of 71 priority pollutant contaminants comprising of metals and acid/base neutral extractables were assayed in bottom sediments. Of the 14 metals, beryllium, chromium, and thallium were the only priority pollutant contaminants that exceeded the screening levels. None of the acid/base neutral extractables exceed the screening levels.

## **4.6 DRINKING WATER MONITORING**

F. E. Walter Reservoir drinking water was in compliance with PADEP drinking water standards for primary and secondary and bacteria with the exception of pH and manganese. Manganese concentration of 0.051 mg/L exceeded the PADEP drinking water

standards by 0.001 mg/L. Measures of pH were less than the standard range of 6.5 to 8.5.

#### **4.7 TEMPERATURE PROBE MONITORING**

Daily mean temperatures calculated from the data recorded by the TidbiT<sup>™</sup> probes deployed at five Lehigh River monitoring stations were examined and compared to PADEP water use criteria for temperature. The analysis indicated that stations WA1, LH3, and LH10 were not in compliance with temperature requirements for a High Quality Cold Water Fisheries for most of monitoring period. Additionally, stations LH15 and LH17, with one exception in the summer months, met the PADEP requirements for a Cold Water Fishery.

